CLAIMS

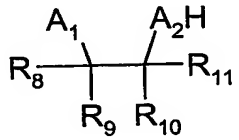
1. A method of preparing an amine stereoisomer, which comprises stereoselectively reducing a sulfinylimine that bears on the sulfinyl group a residue of an alcohol, thiol or amine, or reacting a sulfinylimine stereoisomer that bears on the sulfinyl group a residue of an alcohol, thiol or amine with a source of a nucleophile, to afford a sulfinylamine stereoisomer, followed by contacting the sulfinylamine stereoisomer with a reagent suitable for the cleavage of a sulfur-nitrogen bond, to afford an amine stereoisomer.

2. A method as claimed in Claim 1, wherein the sulfinylimine is a sulfinylimine stereoisomer.

3. A method as claimed in Claim 1 or Claim 2, wherein the residue of the alcohol, thiol or amine is in stereoisomeric form.

4. A method as claimed in any one of Claims 1 to 3, wherein the residue of the alcohol, thiol or amine is a residue of an optionally N-substituted beta-amino alcohol, thiol or amine.

5. A method as claimed in Claim 4, wherein the optionally N-substituted beta-amino alcohol, thiol or amine is a compound of the general formula



wherein A_1 is R_7N or $(R_{7'})R_{7''}N$, R_7 represents hydrogen or -L-R_{7a} in which -L- represents a bond, -CO-, -(CO)O-, -(CO)NR_{7b}-, -SO-, -SO_2-, or -(SO_2)O-, each of R_{7a} and R_{7b} independently represents substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, and $R_{7'}$ and $R_{7''}$ are as defined for R_{7a}, or $R_{7'}$ and $R_{7''}$ together with the nitrogen atom to which they are attached and, optionally R_8, form an unsubstituted or substituted heterocyclic group, or $R_{7'}$ together with the nitrogen atom to which it is attached and the carbon atom to which the nitrogen atom is attached forms an unsubstituted or substituted heterocyclic group; A_2 is O, S or NR_{7c} in which R_{7c} is substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted

heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl; and each of R_8, R_9, R_{10} and R_{11} is independently hydrogen, substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, or R_8 and R_{11} together form a substituted or unsubstituted alkylene or heteroalkylene chain.

6. A method as claimed in Claim 5, wherein A_2 is O.

7. A method as claimed in Claim 5 or Claim 6, wherein each of R_8 R_9, R_{10} and R_{11} is independently selected from hydrogen, (1-4C)alkyl and phenyl, or the alcohol is selected from (N-methylpyrrolidin-2-yl)diphenylmethanol, quinine, quinidine, hydroquinine, cinchonidine, cinchonine, hydrocinchonidine and ethyl hydrocupreine.

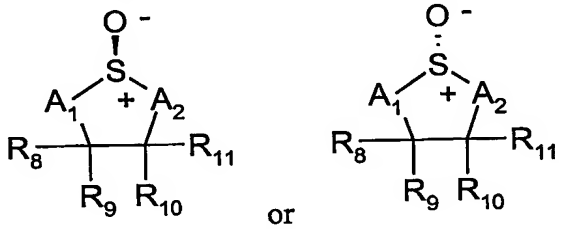
8. A method as claimed in Claim 7, wherein A_1 is R_7N wherein R_7 represents $-SO_2-R_{7a}$ in which R_{7a} represents (1-6C)alkyl, (6-10C)aryl(1-4C)alkyl or (6-10C)aryl in which any aryl group is unsubstituted or substituted by one, two or three substituents selected independently from halogen, (1-4C)alkyl and (1-4C)alkoxy, or $A_{1'}$ is $(R_{7'})R_{7''}N$ wherein $R_{7'}$ and $R_{7''}$ each independently represents a (1-4C)alkyl group or together with the nitrogen to which they are attached represent a pyrrolidine group that may bear one or two methyl substituents, or the alcohol is selected from (N-methylpyrrolidin-2-yl)diphenylmethanol, quinine, quinidine, hydroquinine, cinchonidine, cinchonine, hydrocinchonidine and ethyl hydrocupreine.

9. A method as claimed in Claim 7, wherein $A_{1'}$ is R_7N and the residue of the alcohol, thiol or amine is a residue of an optionally N-substituted 2-amino-1-phenylpropanol, 2-amino-2-methyl-1-phenylpropanol, 1-amino-1-phenyl-2-propanol, 1-amino-1-phenyl-2-methyl-2-propanol, 1-amino-1-phenyl-2-ethyl-2-butanol, 1-amino-2-indanol, 2-aminoindan-1-ol, 1-amino-2-hydroxy-1,2,3,4-tetrahydronaphthalene or 2-amino-1-hydroxy-1,2,3,4-tetrahydronaphthalene, or $A_{1'}$ is $(R_{7'})R_{7''}N$ and the alcohol is selected from 2-N,N-dimethylamino-1-phenyl-2-propanol, 2-N,N-dibutylamino-1-phenylpropanol, 2-pyrrolidin-1-yl-1-phenylpropanol, 2-(2-methylpyrrolidin-1-yl)-1-phenylpropanol, 2-(2,5-dimethylpyrrolidin-1-yl)-1-phenylpropanol, 2- N,N-dimethylamino-2-methyl-1-phenylpropanol, (N-methylpyrrolidin-2-yl)diphenylmethanol, 1-pyrrolidin-1-ylindan-2-ol, 3-

benzyloxy-2-N,N-dimethylamino-1-phenylpropan-2-ol, quinine, quinidine, hydroquinine, cinchonidine, cinchonine, hydrocinchonidine and ethyl hydrocupreine.

10. A method as claimed in any one of Claims 4 to 9, wherein the sulfinylimine has been prepared by contacting an iminometal with a 1,2,3-oxathiazolidine-S-oxide, a 1,2,3-dithiazolidine-S-oxide or a 1,2,3-azathiazolidine-S-oxide.

11. A method as claimed Claim 10, wherein the 1,2,3-oxathiazolidine-S-oxide, a 1,2,3-dithiazolidine-S-oxide or a 1,2,3-azathiazolidine-S-oxide is a compound of formula 3 or 3'

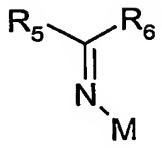


or

3 or 3'

wherein A_1 is R_7N or $(R_{7'})R_{7''}N^+ Q^-$ in which Q- is an anion, R_7 represents hydrogen or -L-R_{7a} in which -L- represents a bond, -CO-, -(CO)O-, -(CO)NR_{7b}-, -SO-, -SO_2-, or -(SO_2)O-, each of R_{7a} and R_{7b} independently represents substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, and $R_{7'}$ and $R_{7''}$ are as defined for R_{7a}, or $R_{7'}$ and $R_{7''}$ together with the nitrogen atom to which they are attached and, optionally R_8, form an unsubstituted or substituted heterocyclic group, or $R_{7'}$ together with the nitrogen atom to which it is attached and the carbon atom to which the nitrogen atom is attached forms an unsubstituted or substituted heterocyclic group; A_2 is O, S or NR_{7c} in which R_{7c} is substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl; and each of R_8, R_9, R_{10} and R_{11} is independently hydrogen, substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, or R_8 and R_{11} together form a substituted or unsubstituted alkylene or heteroalkylene chain;

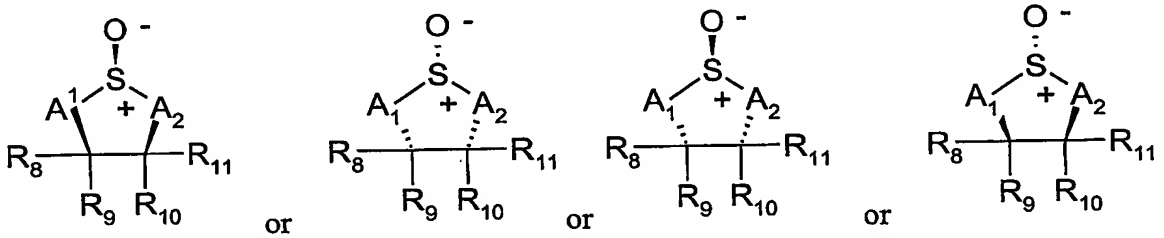
the iminometal is a compound of formula 1'



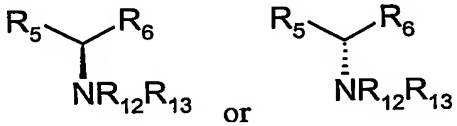
1'

wherein M is CdZ, BaZ, Na, K, MgZ, ZnZ, Li, MnZ, CuZ, TiZ_3 or In and Z is an anion.

12. A method as claimed in Claim 11, wherein the 1,2,3-oxathiazolidine-S-oxide, a 1,2,3-dithiazolidine-S-oxide or a 1,2,3-azathiazolidine-S-oxide is a stereoisomer of formula



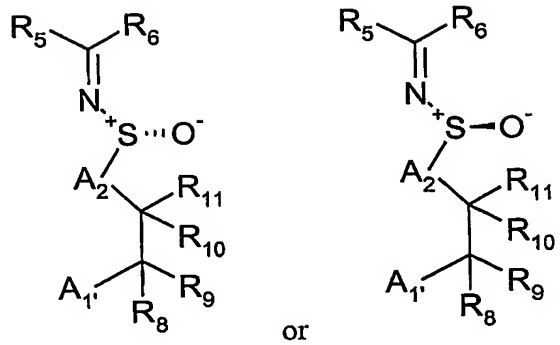
13. A method as claimed in Claim 11 or Claim 12, wherein the amine stereoisomer is a compound of formula 5 or 5'



5 or 5'

or a pharmaceutically acceptable salt, solvate, clathrate, hydrate or prodrug thereof, wherein R_5 and R_6 are independently substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, or R_5 and R_6 together with the carbon atom to which they are attached form a substituted or unsubstituted cycloalkyl group, and R_{12} and R_{13} together with the nitrogen atom to which they are attached form a heterocycle, or each of R_{12} and R_{13} is independently hydrogen, substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, or substituted or unsubstituted aryl;

and the sulfinylamine stereoisomer is a compound of formula 4 or 4'

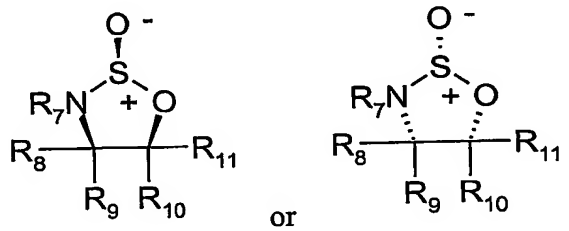


4 or 4'

wherein $A_{1'}$ represents R_7N or $(R_{7'})R_{7''}N$.

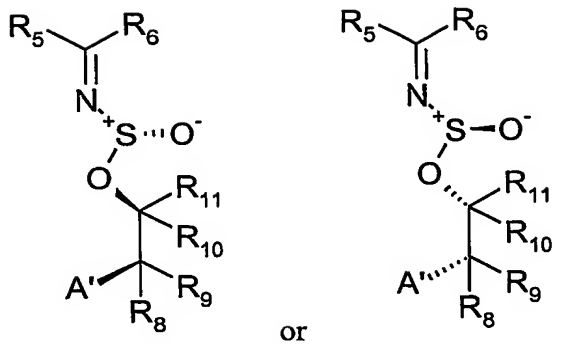
14. A method as claimed in Claim 13, wherein A_2 is O.

15. A method as claimed in Claim 14, wherein R_5 and R_6 are independently substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl; the 1,2,3-oxathiazolidine-S-oxide is a compound of the formula 3 or 3'



3 or 3'

in which R_7 represents hydrogen or -L-R_{7a} in which L is a bond or SO_2 and R_{7a} is substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl; Z in the iminometal of formula 1'is Cl, Br or I; and the sulfinylamine stereoisomer is a compound of formula



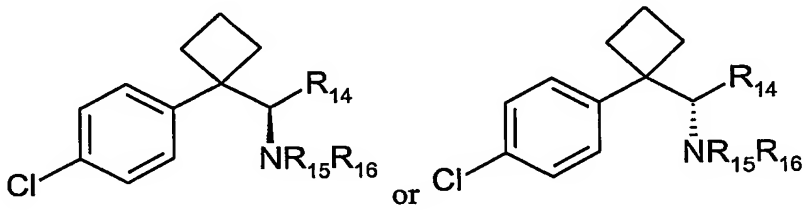
4 or 4'

16. A method as claimed in any one of Claims 12 to 15, wherein R_{12} and R_{13} are both hydrogen.

17. A method as claimed in any one of Claims 4 to 16, wherein the 1,2,3-oxathiazolidine-S-oxide, 1,2,3-dithiazolidine-S-oxide or 1,2,3-azathiazolidine-S-oxide has been prepared by reacting an optionally N-substituted beta-amino alcohol, thiol or amine with a thionyl halide.

18. A method as claimed in any one of Claims 1 to 17, which further comprises the step of alkylating the amine stereoisomer.

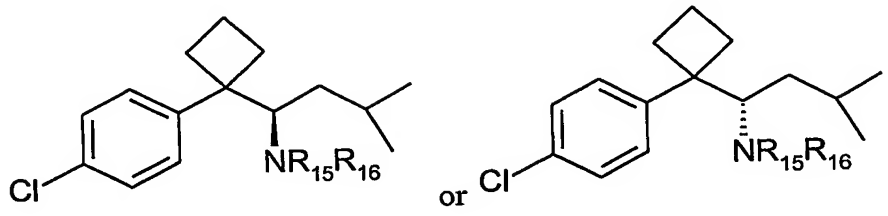
19. A method as claimed in any one of Claims 1 to 18, wherein the amine stereoisomer is a compound of formula



7 or 7'

or a pharmaceutically acceptable salt, solvate, clathrate, hydrate or prodrug thereof, wherein R_{14} is substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aralkyl or substituted or unsubstituted aryl, and R_{15} and R_{16} together with the nitrogen to which they are attached form a heterocycle, or each of R_{15} and R_{16} is independently hydrogen, substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aralkyl or substituted or unsubstituted aryl.

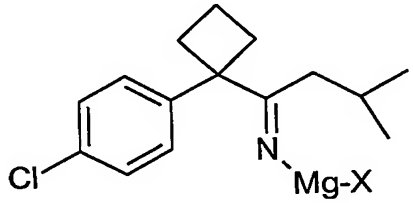
20. A method as claimed in Claim 19, in which the amine stereoisomer is a compound of formula



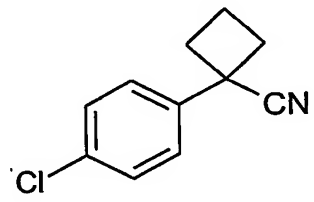
14 or 14'

21. A method as claimed in Claim 19 or Claim 20, wherein R_{15} and R_{16} are both hydrogen.

22. A method as claimed in Claim 21 wherein the metal imine is a compound of formula



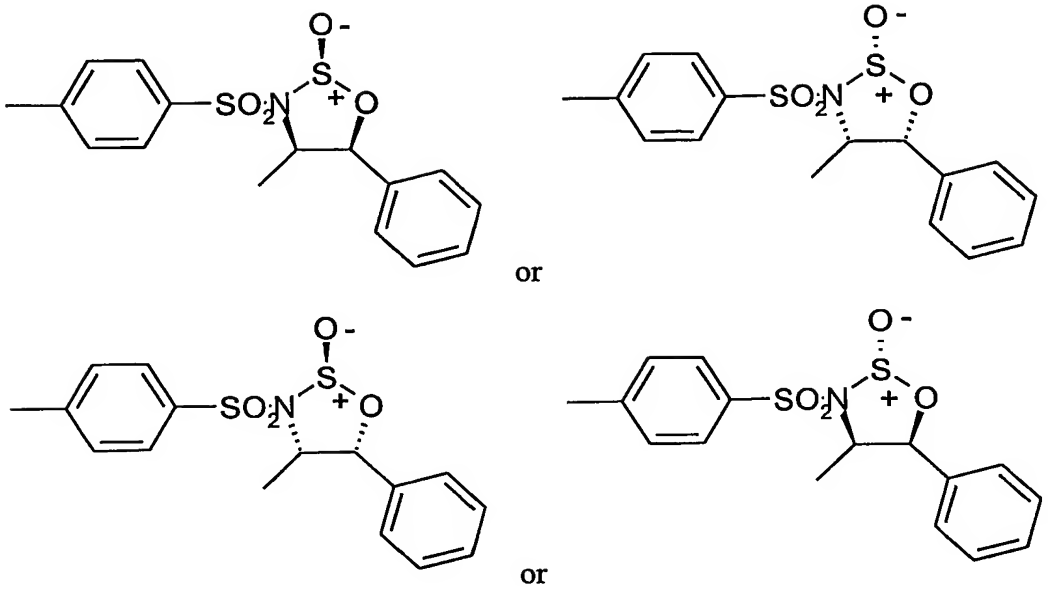
that has been obtained by contacting a compound of formula



15

with a compound of formula i-BuMg-X wherein X is a halogen.

23. A method as claimed in any one of Claims 4 to 22, wherein the 1,2,3-oxathiazolidine-S-oxide is a compound of the formula



or

or

24. A method as claimed in any one of Claims 1 to 23, wherein the sulfinylimine is reduced using a hydride reducing agent.

25. A method as claimed in Claim 24, wherein the hydride reducing agent is $NaBH_4$.

26. A method as claimed in any one of Claims 1 to 25, in which the reagent suitable for the cleavage of a sulfur-nitrogen bond is an acid.

27. A method as claimed in Claim 26 wherein the acid is HCl.

28. A method as claimed in any one of Claims 4 to 27, in which reaction of the sulfinylamine stereoisomer with the reagent suitable for the cleavage of a sulfur-nitrogen bond also affords an optionally N-substituted beta-aminoalcohol, and this optionally N-substituted beta-aminoalcohol is recovered, converted into 1,2,3-oxathiazolidine-S-oxide and recycled.

29. A method as claimed in any one of Claims 1 to 28, wherein the stereoselective reduction of the sulfinylimine is performed using a stereoselective reducing agent.

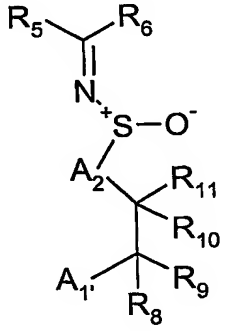
30. A method as claimed in any one of Claims 1 to 29 in which the amine stereoisomer is selected from Alacepril, Benazepril, Benazeprilate, Ceronapril, Cilazapril, Cilazaprilat,

Delapril, Enalapril, Enalaprilat, Fasidotril, Fosinopril, Imidapril, Imidaprilat, Libenzapril, Lisinopril, Moexipril, Moexiprilat, Moveltipril, Pentopril, Perindopril, Quinapril, Quinaprilat, Ramipril, Sampatrilat, Spirapril, Spiraprilat, Temocapril, Temocaprilate, Trandolapril, Trandolaprilate, Utibapril, Utibaprilat, Zabicipril, Zabiciprilat, Bucillamine, Penicillamine, Thiamphenicol, Cefprozil, Cephalexin, Cephaloglycin, Cilastatin, Alafosfalin, Ethambutol, Sertraline, Tametraline, Acetylcysteine, Selegiline, Azaserine, Dorzolamide, Colchicine, Dilevalol, Enalapril, Methyldopa, Metaraminol, Acivicin, Melphalan, Ubenimex, Tmsulosin, Tirofiban, Dilevalol, N-dodecyl-N-methylephedrinium, Ofenucine, Tinofedrine, Aceglutamide, l-ephedrine, levopropylhexedrine, (+)-and (-)-Norephedrine, Phenylpropanolamine, Pseudoephedrine, d-farm, (R)-and (S)-Tamsulosin, Dimepheptanol, Lofentanil, Tilidine hydrochloride (+)-trans, Ciramadol, Enadoline, Lefetamine, Spiradoline, (+)-Etoxadrol, Levoxadrol, (R)-Amphetamine, Clobenzorex, Dexfenfluramine, Dextroamphetamine, Etilamfetamine, Fenfluramine, Levofenfluramine, Phenylpropanolamine, Cetirizine, (R)- and (S)-Baclofen, (R)- and (S)-Sibutramine, and pharmaceutically acceptable salts thereof.

31. A method as claimed in any one of Claims 1 to 23, wherein the sulfinylamine stereoisomer is reacted with a source of a nucleophile selected from a nitrile, a Grignard reagent and an organolithium.

32. A method as claimed in Claim 31, wherein the sulfinylamine stereoisomer is reacted with a nitrile, and the resultant amine stereoisomer bearing a nitrile group is hydrolyzed to afford an amino acid.

33. A compound of formula



4''

wherein:

R_5 and R_6 are independently substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, or R_5 and R_6 together with the carbon atom to which they are attached form a substituted or unsubstituted cycloalkyl group;

A_1 is R_7N or $(R_{7'})R_{7''}N$;

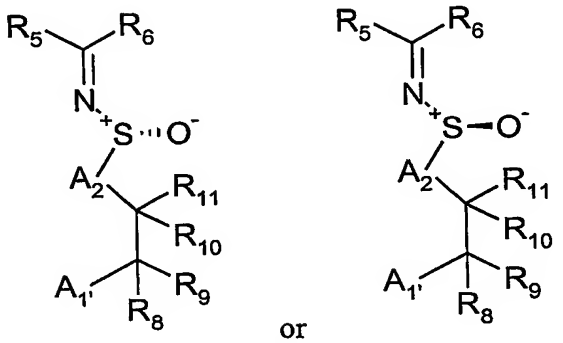
R_7 represents hydrogen or -L-R_{7a} in which -L- represents a bond, -CO-, -(CO)O-, -(CO)NR_{7b}-, -SO-, -SO_2-, or -(SO_2)O-, each of R_{7a} and R_{7b} independently represents substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, and $R_{7'}$ and $R_{7''}$ are as defined for R_{7a}, or $R_{7'}$ and $R_{7''}$ together with the nitrogen atom to which they are attached and, optionally R_8, form an unsubstituted or substituted heterocyclic group, or $R_{7'}$ together with the nitrogen atom to which it is attached and the carbon atom to which the nitrogen atom is attached forms an unsubstituted or substituted heterocyclic group; A_2 is O, S or NR_{7c} in which R_{7c} is substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl; and each of R_8, R_9, R_{10} and R_{11} is independently hydrogen, substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, or R_8 and R_{11} together form a substituted or unsubstituted alkylene or heteroalkylene chain;

A_2 is O, S or NR_{7c} in which R_{7c} is substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl; and

each of R_8, R_9, R_{10} and R_{11} is independently hydrogen, substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, or R_8 and R_{11} together form a substituted or unsubstituted alkylene or heteroalkylene chain,

or a salt thereof.

34. A compound as claimed in Claim 33, which is a stereoisomer of formula

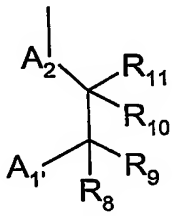


or

4 or 4'

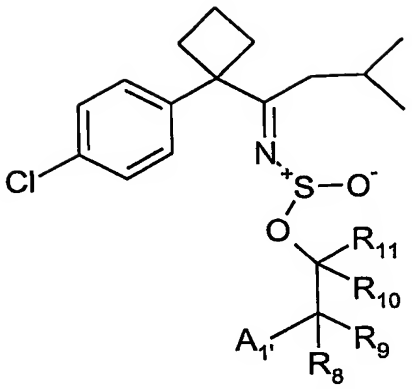
35. A compound as claimed in Claim 34, wherein A_2 is O.

36. A compound as claimed in any one of Claims 33 to 35, wherein A_1 represents R_7N and R_7 represents $R_{7a}SO_2$ in which R_{7a} represents a (1-6C)alkyl, (6-10C)aryl(1-6C)alkyl or (6-10C) aryl group, in which the aryl group is unsubstituted or substituted by one, two or three substituents selected independently from a halogen atom, a (1-4C)alkyl group and a (1-4C)alkoxy group, or A_1 represents $(R_{7'})R_{7''}N$ in which $R_{7'}$ and $R_{7''}$ each independently represents a (1-4C)alkyl group or together with the nitrogen to which they are attached represent a pyrrolidine group that may bear one or two methyl substituents, and each of R_8,R_9, R_{10} and R_{11} is independently selected from hydrogen, (1-4C)alkyl and phenyl, or the group

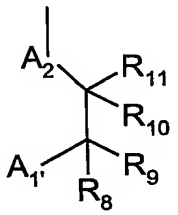


is selected from a residue of (N-methylpyrrolidin-2-yl)diphenylmethanol, 1-pyrrolidin-1-ylindan-2-ol, 3-benzyloxy-2-N,N-dimethylamino-1-phenylpropan-2-ol, quinine, quinidine, hydroquinine, cinchonidine, cinchonine, hydrocinchonidine and ethyl hydrocupreine.

37. A compound as claimed in any one of Claims 32 to 36, which is of the formula

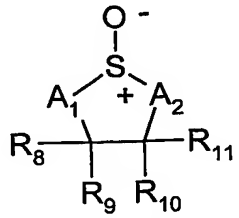


38. A compound as claimed in any one of Claims 32 to 37, wherein $A_{1'}$ represents $R_{7a}SO_2N$ in which R_{7a} represents a (1-6C)alkyl, (6-10C)aryl(1-6C)alkyl or (6-10C) aryl group, in which the aryl group is unsubstituted or substituted by one, two or three substituents selected independently from a halogen atom, a (1-4C)alkyl group and a (1-4C)alkoxy group; or the group



is a residue of 2-N,N-dimethylamino-1-phenylpropanol, 2-N,N-dibutylamino-1-phenylpropanol, 2-pyrrolidin-1-yl-1-phenylpropanol, 2-(2-methylpyrrolidin-1-yl)-1-phenylpropanol, 2-(2,5-dimethylpyrrolidin-1-yl)-1-phenylpropanol, 2- N,N-dimethylamino-2-methyl-1-phenylpropanol, (N-methylpyrrolidin-2-yl)diphenylmethanol, 1-pyrrolidin-1-ylindan-2-ol, 3-benzyloxy-2-N,N-dimethylamino-1-phenylpropan-2-ol, quinine, quinidine, hydroquinine, cinchonidine, cinchonine, hydrocinchonidine or ethyl hydrocupreine.

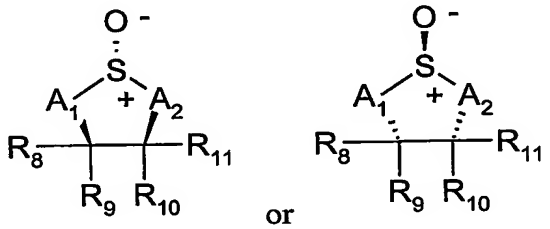
39. A compound of formula



wherein A_1 is $(R_7)R_{7'}N^+ Q^-$ in which Q- is an anion and each of R_7 and $R_{7'}$ independently represents substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted

heteroaryl, or two substituents R_7 together with the nitrogen atom to which they are attached and, optionally R_8, form an unsubstituted or substituted heterocyclic group, or one R_7 substituent together with the nitrogen atom to which it is attached and the carbon atom to which the nitrogen atom is attached form an unsubstituted or substituted heterocyclic group; A_2 is O, S or NR_{7c} in which R_{7c} is substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl; and each of R_8, R_9, R_{10} and R_{11} is independently hydrogen, substituted or unsubstituted alkyl, substituted or unsubstituted aralkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl or substituted or unsubstituted heteroaryl, or R_8 and R_{11} together form a substituted or unsubstituted alkylene or heteroalkylene chain, or a salt thereof.

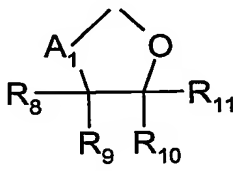
40. A compound as claimed in Claim 39, wherein the compound is of the formula



or

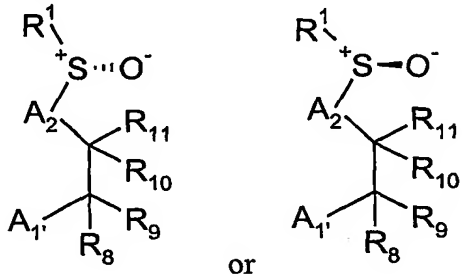
41. A compound as claimed in Claim 39 or Claim 40, wherein A_2 is O.

42. A compound as claimed in Claim 41, wherein $R_{7'}$ and $R_{7''}$ each independently represents a (1-4C)alkyl group or together with the nitrogen to which they are attached represent a pyrrolidine group that may bear one or two methyl substituents, and each of R_8,R_9, R_{10} and R_{11} is independently selected from hydrogen, (1-4C)alkyl and phenyl, or the group



forms a divalent residue of (N-methylpyrrolidin-2-yl)diphenylmethanol, 1-pyrrolidin-1-ylindan-2-ol, 3-benzyloxy-2-N,N-dimethylamino-1-phenylpropan-2-ol, quinine, quinidine, hydroquinine, cinchonidine, cinchonine, hydrocinchonidine or ethyl hydrocupreine.

43. A method of preparing a sulfinylamine or sulfoxide stereoisomer, which comprises reacting a compound as claimed in any one of Claims 39 to 42 with a first organometallic reagent of formula R^1M to afford a compound of formula



and then either reacting this compound with a second organometallic reagent of formula R^2M to afford a sulfoxide stereoisomer of formula

$$R^1\text{-SO-}R^2$$

in which R^1 and R^2 each independently represents an organic group, or with an alkali metal amide to afford a sulfinylamine stereoisomer.

44. A method as claimed in Claim 43, in which the first organometallic reagent is an organomagnesium halide.

45. A method as claimed in Claim 44, in which the first organomagnesium halide is an alkyl or arylmagnesium halide.